Chief of Laboratory of Plant Pathology Says They Are Especially Qualified for Work. Bacterial Diseases of Plants Are Sought Out and Studied, and Efforts Are Being Made to Cut Down Great Loss to Farmers, Horticulturists and Fruit Growers - College Women Who Have Worked for Years to Attain the Scientific Knowledge of Their Study-An Important Experiment Now Being Keenly Watched.

forts of an increasing number of am nan workers, and nowhere



has developed to a point where with three exceptions its entire corps of assistants is exclusively feminine. visit to this laboratory brings one into the interesting atmosphere of modern science. Here the comparatively young study of bacterial diseases of plants is pursued by woman patholo-gists, a class of workers which is a distinct product of recent years.

Under the direction of Dr. Smith these women-seven in number-diagses of diseased plants from all nature of the bacteria which cause the diseases seek to prevent an annual loss, aggregating many millions of loss, aggregating many many lollars, to farmers, horticulturists and fruit growers. They are officially known as "scientific assistants," though four have done independent research while connected with the laboratory which has entitled them to

Florence Hedges, who has been than any of the others, has made a special study of the discases of grape-fruit, lemon, lime and orange irces. Her bulletin on the subject contains the first published account of a tumor disease to which citrus trees are liable. Miss Nellie A. Brown, another of the assistants, has done important work in the study of bacterial diseases of lettuce and sugar beets, and in collaboration with Dr. Smith and Miss Lucia McCulloch, also of the laboratory, has published an important bulletin on the structure and development of plant tumors.

pleted a study of a bacterial disease of nasturtiums, which has just been pullished in the department's Journal of Agricultural Research.

Mrs. Ella M. Enlows, the latest acquisition to Dr. Smith's carps of scientific workers, has thus far done no independent research. To use Dr. Smith's words, "she is now passing through three primary years of scientific drudgery, from which she must graduate before she can pursue an independent line."

In searching out the parasites which destroy plant life by causing disease, they work in a most careful and scrupulously exact manner. Characteristics of the different kinds of bacteria are studied to find out their life.

The work which these women carry on is of grave purport. The time which they spent in preparation for it was The Department of Agriculture, with long and their training was arduous. They are a corps of workers who have earch, has long held out a beckoning specialized to the utmost in scientific at college, each has had at least two years of post-graduate training. They are skilled linguists, deeming this accomplishment a very necessary one, if they hope to keep abreast of the new discoveries being made in foreign laboratories. And last, mentioned at this point not because it is least, for, indeed, it is the backbone of all their research and discovery, they have an unbounded love of nature and interest in all living things, which is the font of their inspiration. With such scientific and temperamental readiness for their profession, as may be expected, their work is carried on with a maximum of efficiency.

Dr. Smith states that he has found certain types of women to be especially qualified for laboratory work in science, provided they are willing to give time to the required training. They are deft with their fingers, he says; are less restless than their brothers, which permits them to work in harmony with others, and have as good brains as men. All of which testimony, though not personal, puts a final stamp of approval on the feminine personnel of the laboratory of plant pathology and speaks favorably for the status of feminine scientists in the onlying of at least once of their mas.

good brains as men. All of which testimony, though not personal, puts a final stamp of approval on the feminine personnel of the laboratory of plant pathology and speaks favorably for the status of feminine scientists in the opinion of at least one of their masculine co-workers.

A mere statement of facts will tell more specifically how well the women of this laboratory are trained for their work. They are assembled from colleges all over the country. Miss Hedges is a graduate of the University of Michigan, and has had additional training at the Michigan Agricultural College: Miss McCulloch is a graduate of the University of the University of Florida, with additional training at the University of Michigan, and has had additional training at the University of Michigan and has carried on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observations of the culture media on the scientific menu is noted also. Thus, all observations of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture media on the scientific menu is noted also. Thus, all observation of the culture processes not less than under the pacteri



MISS LUCIA MCCULLOCH.

tumors.

Miss Mary Katherine Bryan, another member of the staff, has recently completed a study of a bacterial oisease of laude from George Washington Universities which has just been pure.

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When the time comes to study the re

lation of the parasite to the plant cell

iny sections are sliced off by the mi-

egulated to cut thinnest shavings from

he paraffin block. These shavings are

tion on the plant. Hundreds of these tle paraffin blocks are stored away in

ne laboratory, numbered and recorded, be easily consulted for reference

To any layman the most wonderful eature of this work lies in this ob-

disease all over the world are made through just such cautious and precise

labor, then does the marvel of modern science find its symbol and the spirit of

the age its embodiment.

nderful

henever they may be asked for.

MISS MARY KATHERINE BRYAN.

ertain kinds of plants are held in the soil from year to year. In this case resistant or other crops are recom-mended, and soil which might have been a continual failure is converted

Or, to cite another example illustrating the scope of the laboratory's re-search, it may be wondered if plant bacteria will cause disease when in oculated into animals. To ascertain this fact, the laboratory staff is workof fish and salamanders which have been inoculated with bacteria taken from plant tumors. These experiments are watched with extreme interest, for their outcome, if positive, will be a

NE of the most interesting angles from which one may view the scientific profession today reveals its growth in feminine interest. During the ecade science has become one most alluring fields for the ef-Cash, who takes care of and does bibliographical short, the habits of these minute thieves of plant health are determined through a study of the nature of their associates and their environment.

One cannot pick up a diseased leaf, however, and reach any definite conclusions about its parasites by simply preparation for it was training was arduous. This process of making a pure culture must be followed. This process separates; she exercises extreme care in every-



that can be prepared. Scientists must take no chances on the quality of the

year.
So Miss Quirk is a most scrupulous housekeeper. She uses glass cooking utensils, which can be cleaned perfectly. When she washes her apparatus she uses distilled water.
Over 40,000 test tubes of culture media are used in this laboratory in a year. It is Miss Quirk's duty to fill each of these, clean them when the media are discarded and put them in readiness

the paraffin block. These shavings are stained after removal of the paraffin, mounted under a glass cover and placed under the microscope, where they are studied to give light on the morphological features of the bacteria and their action on the plant. Hundreds of these

the mihis instruof moving
of moving
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partial may a minor detail, but
the work
it illustrates better than anything else the woman pathologists.

the magnanimous spirit which prevails among these woman pathologists.

Usually It Is Like Their Sons or

the age its embodiment.

But this is only one element of the work. Another branch takes the pathologist away from the laboratory to the greenhouse. Here, with solutions containing pure cultures of the various bacteria under observation, they inoculate fresh, healthy plants either by needle puncture or by spraying. This procedure gives an opportunity to study the action of the bacteria on the study the action of the bacteria on the plant and to determine which, if any, of the various ones are the actual cause of the disease as it progresses through its various stages. For it offen happens that the commonest organism found in connection with the disease is not the cause of it.

Plants vary in their receptivity to woman voters think and act, in the

woman voters think and act, in the nain, like their sons and husbands. Suffrage has wrought no great reforms anywhere. Evil flourishes, virtue trianywhere. Evil flourishes, virtue triumphs, the average excellence is maintained, where women vote precisely as
have a glass window, not less than 3x4
feet, in the front, and an opening of
rear, but should be at least seven feet profitably devote a good many hours
to repairs and replacement work—
that have are depied the ballot
feet, in the front, and an opening of
rear, but should be at least seven feet
to repairs and replacement work—
the rear but should be at least seven feet
to repairs and replacement work—
tinkering up the houses, recovering
feet, in the front, and an opening of where they are denied the ballot.

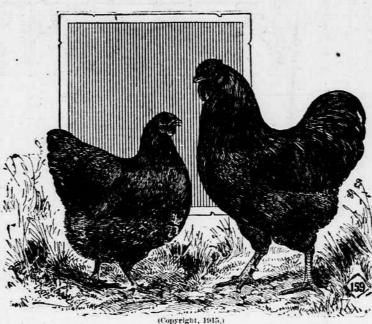
the ballot not on the plea that they are superior creatures, ready to regenerate the politics and the state, and held back from the consummation of

mental reaction in the feminine as in the masculine mind; that a sequence which appeals as logic to the one appears no less logical to the other. The end of the war will come when men and women alike are convinced of its futility from the standpoint or another. The end of corruption and inefficiency in public life, here and abroad, will come not through any special aptitude women may be supposed to have for the destruction of evil, but through their willingness to co-operate with "sons or busbands" to that good purpose.

EXPLAINED.

Mabel - He traces his ancestry back to four kings, I believe!

BLACK WYANDOTTES.



Birds that were almost black were and the fowls always present

this, combined with other good qualities, makes them a profitable farmer's flow, while, on the other hand, they do well in confinement, as do all Wyandottes. This is in favor of their use in the small back-yard flock where the hens will keep the table supplied with eggs, and if chicks are reared you the fertilizing value on the compost heap way have table poultry at any time sessing greater powers. ognized as a pure variety in 1893.

Black Wyandottes are excellent layers, grow fast and make excellent broilers and table fowls, being plump and compact, with rich, yellow skins. They mature early and begin laying probably sooner than any other Wyandotte. They do well in small space, and are excellently adapted to the back-yard poultry plant. Their brilliant greenish-black plumage does not show the dirt and soil of confinement,

only in the spring.

Third-Buy laying hens or pullets

y lay the heaviest in their first year. his method costs more at the start,

but is probably the safest for the be-ginner, and can be used at any time of the year, especially in the fall and winter when the demand for eggs is

In the selection of breeds it pays best

varieties; that is, those that have been

duction, or a combination of egg and

tractive, being uniform in color and will produce both eggs and meat more satisfactorily than a mixed lot.

For eggs alone, the Single Comb White Leghorn is one of the leading varieties. If it is desired to produce both eggs and meat, the Plymouth Rocks, Rhode Island Reds, Orpingtons and Wyandottes all are valuable and any of these will prove profitable as "dual-

Poultry raisers who are operating on a small scale often make the mistake of attempting to carry too many fowls or expecting too large a profit on a small number of fowls, especially at the

As autumn advances and the season

of frosty nights approaches, heralding

erating small or large plants may

roofs, making everything tight and

profitably devote a good many hours

the advent of winter, poultrymen op

BACK YARD POULTRY **WILL CUT LIVING COST**

Twenty-Five Hens Can Be Kept in Comparatively Small

Waste From the Table May Be Turned Into Eggs and Meat.

cost of living. Economy in the house hold is secured by turning table scraps how to start with a home flock of poul-

Since eggs and meat are considered ly every householder with room for a small flock of poultry can make the

table scraps that otherwise would go

and this is true of meat of all ds. There is no better and easier when one wants them without having to pay high prices, particularly in the winter, when they are most needed, and it is worth something, too, to be able to get "strictly fresh" eggs without having to go to the store.

of these will prove purpose" fowls.

Poultry raisers wh a small scale often of attempting to car or expecting too la

Only Small Space Required.

The space required for twenty-four hens need not be more than 10x12 feet for housing and 12x50 feet for yarding, or even less. In fact, some successful small flocks of poultry are confined to houses with four square feet of floor space for each fowl and equal space for for housing and 12x50 feet for yarding, or even less. In fact, some successful space for each fowl and equal space for the yard.

When kept in so small a space the birds, of course, require more care, and if more room is available it should be

used.
The house should be what is known as the shed type, with the roof sloping from the front to the rear. It need not be more than five feet high in the teach to the rear least seven feet. where they are denied the ballot.

And the fact may well be considered an argument for, not against, the suffrage propaganda. Women should ask the ballot not on the plea that they are superior creatures, ready to regen-

Avoid Expensive Buildings.

they cannot vote; but on the far more tenable claim that, thinking and acting like men and holding the same general views upon problems settled at the polls, they should be given a full partnership in public affairs.

Considerations of the present war quite aside, it is rather fortunate that a thousand and one "are willing to accompany their sons or husbands to fight." It speaks well for the solidarity of the race that the same set of facts compet the same mental reaction in the feminine as in the masculine mind; that a sequence which appeals as logic to the one of the same set of facts come that a sequence which appeals as logic to the one of the same set of facts come that the same set of facts compet the same set of facts competition. The fact that the same set of facts competition that exists between try keeping on a commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings. Successful commercial scale make the mistake of erecting expensive buildings can be put upon the same of the farm o

and practicable buildings can be put and practicable buildings can be put up for even less than this.

For a number of years one prominent egg farm has kept 500 laying hens in a house 100 feet long and 14 feet wide. This house is nine feet five inches high in the front, with a height at the back of four feet, five inches. By making the roof high in front, the operator can do his work easily without bumping his head; and the lower ceiling in the back helps to keep the house warmer in winter. This house gives warmer in winter. The color of the paper itself helps to shorten its life, black being an absorber of heat rays; so that the summer sun dries out and hardens the materials, causing it to become brittle and cracked, and to curl up at the edges and draw away from the fowls kept in it are a Mediterranean vaslety, which do not require as much room as larger breeds.

Economy in the construction of poultry houses may be secured by using prepared roofing, but the builder should be careful to select only a good grade of roofing. Cheaply prepared roofings to pieces quickly, and it is economy to spend a few cents more per square to secure several years' longer service.

Simple Construction Best.

Simple Construction Best.

Simple Construction Best.

Make the poultry house as simple in construction as possible. Fancy fixtures, elaborate mess boxes, etc., add nothing to its efficiency, but add considerably to the cost.

Opposed to this system of keeping many fowls in one house is the col-

The way to avoid such epidemics is to prevent them, and the way to do this is to make sure that the quarters are as dry and as free from drafts as they can be made. It costs little, either in actual cash expenditure or in time, to replace all tar paper roofs with new roofing material; and the expense and labor is amply compensated by the consequent freedom of the layers from the account freedom of the layers from productive capacity. many fowls in one house is the colony house system, which is used suc cessfully by many poultrymen. The colony houses are seldom more than 8x12 feet in floor area and they are generally built on skids so that they may be hauled from place to place. These cost more per fowl than the larger houses, but have the advantage of being easily movable and by being serviceable in the spring as brooder houses, in the summer as homes for flocks of young stock and in winter for housing laying fowls or breeding pens.

Adult hens may be fed entirely on table scraps, but young chicks should not be fed table scraps from the becessfully by many poultrymen. The colony houses are seldom more than

roof of one of the heavier and more durable materials to be had at all places selling builders' materials and at many poultry supply houses. These roofing materials are well advertised, and no poultryman can plead ignorance in regard to proper materials or how to use them, if he will only read the like; to get the berry will be to get the berry

By far the larger proportion of poultry houses built nowadays are of the open-front or semi-open-front style, facing south or southeast. Such houses invariably have the roosts at the back, or north, side—the coldest side of the house, naturally. If the rear wall is full of cracks, crevices and open places, that permit the free ingress of north or northwest winds, the fowls cannot fail to be uncomfortable at night while on the roosts. The way to prevent this is to make absolutely sure the exposed side of the house is weather tight. Cover every crack, crevice and ctanny, either with tar paper or building paper, or with new siding material. Fallure of scores of large and small poultry plants, because the hens refused to lay during the winter, when eggs were high in price, may be laid directly to the fact that the quarters of the fowls were not proof against cold winds, driving rains or sifting snows.

When the leaves begin to fall from the

old before they receive an entire feed

of table scraps. By "table scraps" is meant the left-overs of meats, bread, pies, cake, etc., potatoes, cabbages and other vegetables. This also includes the road dust, which contains a considerable amount of sand and gravel, is fine, as the fowls obtain much natural grit from it, while the sharp particles of the sand, penetrating to the roots of the feathers, make the material ideal for a dust bath for the poultry. other vegetables. This also includes the trimmings of meat, lettuce, potato peelings and the like. These should be cooked together when fed to young chicks, but for the older hens they may be chopped fine and given raw.

When not enough table scraps are secured to feed the flock, the scraps may be cooked and mixed with equal parts of bran and corn meal, and this mixture fed to the fowls three times a day. When a wet mash is fed this way it is better also to give the hens a light feeding of grain early in the ideal for a dust bath for the poultry. The material should be stored away in barrels or boxes in a place where it will keep perfectly dry until it is wanted. Ordinary soil from the garden or field, if dug while as dry as possible and then stored in the cellar or basement, where the heat of the furnace will drive out the remaining moisture, is good. Of course, if the nearby roads have been oiled, it should be unnecessary to advise against the gathering or use of dust from along their edges. But if there is a creek or small stream handy, along the banks of which sandbars are frequent, get just as much of the dry, somewhat gravelly, sand as possible—mixed with the dust of dry soil it furnishes dust baths, and at the same time renders unnecessary any expenditure for grit a light feeding of grain early in the morning and late in the afternoon. started with a small flock as outlined ncubator. If the incubator is correctly handled, and the hatch turns out satisfactorily, this method is doubtless the cheapest, but a beginner will fre-quently overlook some important de-tails of incubation and thus make his

If crimson clover has been sown, very well; the problem will be solved. Or if provision has been made for a big plot of spinach, this will supply green feed, as will the tops of late-sown turnips, especially if these are given a slight covering of straw or leaves before hard freezing weather comes. And ore hard freezing weather comes. And f the root cellar is filled with turnips rutabagas, carrots, etc., and a good supply of late cabbage has been stored

These are the days in which to mal to do all the little odd jobs of repair work on lawns, walks, ditches and the like; to get the berry vines and the fruit trees in shape and to have every rigors of winter and be in good condicomes. The forehanded man who takes September and October to put the place in the best possible condition is th best appearance and who is not obliged to work himself to death in the spring and early summer doing the work that should have been done several months

If directions given in this column early last summer were followed, and all of the raspberry and blackberry canes which fruited were marked with pieces of raffia, the work of thinning and cutting out will be much simpli-fied. Canes that bore fruit the past sea-son are done and will yield no more

posed use the pruning shears. This is the time when the trees are becoming cut away the extra wood, making th tar or pitch or with a good irrade roofing paint to prevent the attacks fungus diseases—rots of various kin -that otherwise might find points o

Do not neglect the frequent cutting of weeds wherever they may happen to spring up. Late summer and fall weeds mature crops of seeds that are scatwinds, and such sowings produce the weeds that give every careful farmer and gardener so much work every spring and summer.

bled each fall with the problem of ho to store and care for excess crops o in the garden itself; the making of ou of sorting and storing the various ro he details the average city man pre-paring for his first winter in the coun

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